To Find

Expected value of the larger of x or y, let $f(x)$ and $g(y)$ be probability density of x and y, respectively

$$f(x, y) = f(x) g(y)$$

$$E = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} z(x,y) f(x) g(y) \, dx \, dy$$

where $z(x, y)$ = x if $x > y$

= y otherwise

Then,

$$E = \int_{-\infty}^{\infty} g(y) \left[y \int_{-\infty}^{y} f(x) \, dx + \int_{y}^{\infty} x f(x) \, dx \right] dy.$$